ASTR100: The Universe

Section 50810 – Fall 2024

Instructor:	Prof. Kris Pardo	**Class Location:**	SLH 100
Email:	kmpardo@usc.edu	**Class Day/Time:**	MWF 2:00–3:20pm
Office Location:	ACB 528	**Textbook:**	*Foundations of Astronomy*
Office Hours:	Mondays 1pm-2pm		Seeds & Bachman
	or by appointment		14th Edition

COURSE OVERVIEW

Welcome to ASTR 100: The Universe! In this course, we will address some of humankind's oldest questions: "What is the universe?", "What is our place in it?", "How old is it?", "What is it made out of?", and so on. We will start by understanding the basics of astronomy, including how astronomers make observations. We will then make a journey from our Solar System all the way to the farthest reaches of space and time, and take a deeper look into the physics underlying astronomical phenomena. We will discuss how the science of astronomy has furthered the development of physics, and how physics enables the understanding of the entire universe.

This course is designed specifically for non-science majors who have very little, if any, background in the sciences and mathematics. The course is non-mathematical by prerequisite, but you will have to learn to do some calculations. These calculations will be very simple and will employ formulae that are easy to remember. You will have the opportunity to note that formulae represent ideas. You will also have the opportunity to examine the notion of scientific discovery and look at how scientists translate data into knowledge about the universe. One of the goals of this course is to show you how the scientific thinking applied in astronomy can also be useful in everyday life.

LEARNING OBJECTIVES

After completing this course, students will be able to:

- Name the observations that led to key astrophysical discoveries.
- Explain basic astronomical phenomena (phases of the Moon, meteorites, motions of stars, etc.).
- Identify the order of magnitude of astronomical distances and timescales.
- Describe the life cycle of stars and identify key physical processes involved.
- Broadly describe the Solar System, our Galaxy, and the Universe as a whole.
- Draw a connection between the process of building knowledge in the sciences and in everyday life.

REGISTRATION & ATTENDANCE

Your registration for this course consists of three separate parts: the lectures, a "quiz section," and the laboratory. You must register for each of them, even though the quiz section will not be used for this course. This class is designed assuming an in-person attendance of all lectures. However, for everyone's safety, if you are feeling sick or have had a positive COVID-19 test, please stay at home, check Blackboard for lecture materials, and contact the instructor if you have any questions or concerns regarding the materials.

The Undergraduate Physics Office in ACB 439 deals with all administrative aspects of this class.

GRADING AND EVALUATION

You will be able to access all your grades via Brightspace. Your grade will be determined according to the following key:

- Homework – 10%
- Midterms – 40% (20% each – only the two highest scores out of the three midterms will be counted)
- Lab/observation sessions – 20%
- Final exam – 30%

Broadly speaking, grading is done by the distribution curve of the combined scores of exams, homeworks, and lab/observation sessions. No rigid percentage marks (such as, e.g., a rule that 90% corresponds to an A-, or similar) are used, and the curve will be determined and announced for each exam separately, after all students' scores are recorded. Further details about the grading procedure will be discussed in class.

Important: To pass this course, all of the following conditions must be met:

- You are required to earn a passing grade (70%) on the lab portion of the course, regardless of your scores on other components.
- You are required to take the final exam and at least two midterm exams.
- Students taking the course for a letter grade will need a grade of C or better (usually around 70% total grade) to pass the course.
- Students taking the course Pass/No Pass will need to reach a minimum overall score of 70% to pass the course, regardless of the manner in which letter grades are assigned.

EXAMS

There will be three one-hour midterm exams and one two-hour final exam. The midterms will be given during class on the day they are scheduled (on **September 20**, **October 23**, and **November 20**; see schedule table below), and **the final exam is on Friday, December 13th, 2-4pm**. Of the three midterms, only the scores of the two highest will be counted, and the lowest score of will be dropped. The midterms will cover the course material incrementally throughout the semester, and the final exam will cover the whole course. All exams are administered in person and are closed book/notes.

Important: Please note that the third midterm serves as a make-up exam for either of the first two exams. **If you miss any of the first two midterms, for any reason, you are required to take the third midterm in order to pass the course.** Students who have attended the first two midterms can take the third as an added opportunity to further improve their grade. No other makeup exams will be offered. All students must take the final exam to pass the course.

HOMEWORKS

Homework assignments will be due approximately every other week, at 11:59pm Pacific Time, as denoted in the schedule below. Each of the 6 assignments will be worth 100 points, and a cumulative score of 400 out of the maximum 600 points will equate to a 100% homework grade (this is equivalent to, but better than, dropping two homework scores, as you can use all 6 assignments to reach the 600 points). Homework will count for 10% of your total score.

Please note that exceptions will not be made to homework deadlines for any reason, so don't skip homeworks except in the case of a medical reason or another emergency. You do not need to notify the instructor if you decide to skip a homework assignment.

LABS

ASTR 100 has a mandatory laboratory component, and you should already be signed up for one of the laboratory sessions. The purpose of the laboratory is to give you some feeling for making and interpreting

observations, thereby reinforcing some of the course material by direct experience. Another purpose is that you can get some hands-on experience using a telescope. You can see spectacular pictures taken from large telescopes around the world or from space telescopes. The observation session will show you what is possible from a small, but good "amateur" telescope.

Note that late registration in the course does not present a valid excuse from any labs you have missed, and you must contact the Lab director, Joseph Vandiver (SGM 309; Phone: (213)-740-8889; Email: vandiver@usc.edu) immediately if you have signed up late for the course.

For our class, your first meeting will be held in the first week, on your specific laboratory day. It is very important to attend the first session. Please note that the organization of the laboratory is completely independent of the rest of the class. Therefore, your laboratory grade (which, as mentioned above, constitutes 20% of your overall score) will be derived solely from your performance in the laboratory, and in accordance with the rules established by the laboratory. All questions regarding the Lab should be directed to Joseph Vandiver.

RESOURCES & SUPPORT Beyond the required textbook listed on the first page of this document, you should also take advantage of several other resources available to you:

- **Lecture**: Do not underestimate the value of questions during the lecture period. In large lectures, many students are reluctant to pose questions that they fear might seem silly to their instructor or to their peers. Almost always, if one student asks a question, there are several other students who were wondering about the same issue. Often such questions tell the instructor what material might benefit from a more detailed discussion. I wholeheartedly encourage you to ask questions in class.

- **Office hours**: I will have office hours each week (times listed on the first page of this syllabus). If you cannot make it to the listed office hours, you can also make an appointment to see me by using the link on the first page of this syllabus. This link will **not** let you make a same-day appointment. So, please plan ahead.

- **Brightspace**: Everyone registered in this course should find a link to the course in their Brightspace account. All information about the course will be posted on Brightspace. At this address, you will find this syllabus, important announcements, etc.

- **Internet**: There is also a vast amount of information about astronomy on the internet. In particular, Wikipedia is considered a (mostly) reliable source for astronomy, so don't shy away from using Wikipedia in your web searches.

FEEDBACK

Feedback regarding all aspects of these lectures is very much appreciated and welcome at any time. Please get in touch with me via email, after lectures, or during office hours. You can also anonymously submit feedback via this google form.

ACADEMIC INTEGRITY

The University of Southern California is foremost a learning community committed to fostering successful scholars and researchers dedicated to the pursuit of knowledge and the transmission of ideas. Academic misconduct is in contrast to the university's mission to educate students through a broad array of first-rank academic, professional, and extracurricular programs and includes any act of dishonesty in the submission of academic work (either in draft or final form).

This course will follow the expectations for academic integrity as stated in the USC Student Handbook. All students are expected to submit assignments that are original work and prepared specifically for the course/section in this academic term. You may not submit work written by others or "recycle" work prepared for other courses without obtaining written permission from the instructor(s). Students suspected of engaging in academic misconduct will be reported to the Office of Academic Integrity.

Other violations of academic misconduct include, but are not limited to, cheating, plagiarism, fabrication (e.g., falsifying data), knowingly assisting others in acts of academic dishonesty, and any act that gains or is intended to gain an unfair academic advantage.

The impact of academic dishonesty is far-reaching and is considered a serious offense against the university and could result in outcomes such as failure on the assignment, failure in the course, suspension, or even expulsion from the university.

For more information about academic integrity see the student handbook or the Office of Academic Integrity's website, and university policies on Research and Scholarship Misconduct.

Please ask me if you are unsure about what constitutes unauthorized assistance on an exam or assignment, or what information requires citation and/or attribution. In this class, you are expected to submit work that demonstrates your individual mastery of the course concepts. Unless specifically designated as a 'group project', all assignments are expected to be completed individually.

DISABILITY ACCOMODATIONS

USC welcomes students with disabilities into all of the University's educational programs. The Office of Student Accessibility Services (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at `osas.usc.edu`. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu.

FACULTY LIAISON

All courses in the Department of Physics & Astronomy have an assigned Faculty Liaison to serve students as a confidential, neutral, informal, and independent resource when they wish to discuss issues concerning their course without directly confronting their instructor. The Faculty Liaison for this course is Prof. Jack Feinberg (feinberg@usc.edu, 213-740-1134, SSC 327).

STUDENT SUPPORT SYSTEMS

Counseling and Mental Health - (213) 740-9355 – 24/7 on call
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

988 Suicide and Crisis Lifeline - 988 for both calls and text messages – 24/7 on call
The 988 Suicide and Crisis Lifeline (formerly known as the National Suicide Prevention Lifeline) provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week, across the United States. The Lifeline is comprised of a national network of over 200 local crisis centers, combining custom local care and resources with national standards and best practices. The new, shorter phone number makes it easier for people to remember and access mental health crisis services (though the previous 1 (800) 273-8255 number will continue to function indefinitely) and represents a continued commitment to those in crisis.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL) – 24/7 on call
Free and confidential therapy services, workshops, and training for situations related to gender- and power-based harm (including sexual assault, intimate partner violence, and stalking).

Office for Equity, Equal Opportunity, and Title IX (EEO-TIX) - (213) 740-5086
Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298
Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

The Office of Student Accessibility Services (OSAS) - (213) 740-0776
OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

USC Campus Support and Intervention - (213) 740-0411
Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity, Equity and Inclusion - (213) 740-2101
Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call
Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-1200 – 24/7 on call
Non-emergency assistance or information.

Office of the Ombuds - (213) 821-9556 (UPC) / (323-442-0382) (HSC)
A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

Occupational Therapy Faculty Practice - (323) 442-2850 orotfp@med.usc.edu
Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.

TENTATIVE COURSE SCHEDULE

Week	Date	Material Covered	Deliverables Due
1	Aug. 26	Ch. 1: Here & Now	
	Aug. 28	Ch. 1 (cont.) / Ch. 2: A User's Guide to the Sky	
	Aug. 30	Ch. 2 (cont.)	
2	Sept. 2	NO CLASS (Labor Day)	
	Sept. 4	Ch. 2 (cont.)	
	Sept. 6	Ch. 3: Moon Phases & Eclipses	
3	Sept. 9	Ch. 3 (cont.)	
	Sept. 11	Ch. 4: Origins of Modern Astronomy	Homework 1 (due Sept. 11)
	Sept. 13	Ch. 5: Gravity	
4	Sept. 16	Ch. 5: Gravity (cont.)	
	Sept. 18	Review for Midterm Exam 1	
	Sept. 20	Midterm Exam 1	Midterm 1 (Sept. 20)
5	Sept. 23	Ch. 6: Light & Telescopes	
	Sept. 25	Ch. 6: Light & Telescopes (cont.)	
	Sept. 27	Ch. 7: Atoms & Spectra	
6	Sept. 30	Ch. 7: Atoms & Spectra (cont.)	
	Oct. 2	Ch. 18 - 24: The Solar System	Homework 2 (due Oct. 2)
	Oct. 4	The Solar System (cont.)	
7	Oct. 7	The Solar System (cont.)	
	Oct. 9	Extrasolar Planets (18.4)	
	Oct. 11	NO CLASS (Fall Break)	
8	Oct. 14	Extrasolar Planets (cont.)	
	Oct. 16	Ch. 8: The Sun	Homework 3 (due Oct. 16)
	Oct. 18	Ch. 8 (cont.)	
9	Oct. 21	Review for Midterm 2	
	Oct. 23	Midterm Exam 2	Midterm 2 (Oct. 23)
	Oct. 25	Ch. 9: The Family of Stars	
10	Oct. 28	Ch. 9 (cont.)	
	Oct. 30	Ch. 11, 12: Formation, Structure, & Evolution of Stars	
	Nov. 1	Ch. 11, 12 (cont.)	
11	Nov. 4	Ch. 13, 14: The Deaths & Remnants of Stars	Homework 4 (due Nov. 4)
	Nov. 6	Ch. 13, 14 (cont.)	
	Nov. 8	Ch. 15: The Milky Way Galaxy	
12	Nov. 11	NO CLASS (Veteran's Day)	
	Nov. 13	Ch. 15 (cont.) / Ch. 16: Other Galaxies	
	Nov. 15	Ch. 16 (cont.)	Homework 5 (due Nov. 15)
13	Nov. 18	Review for Midterm Exam 3	
	Nov. 20	Midterm Exam 3	Midterm 3 (Nov. 20)
	Nov. 22	Ch. 17: Modern Cosmology	
14	Nov. 25	Ch. 17 (cont.)	
	Nov. 27	NO CLASS (Thanksgiving)	
	Nov. 29	NO CLASS (Thanksgiving)	
15	Dec. 2	Gravitational Waves	
	Dec. 4	Gravitational Waves (cont.)	Homework 6 (due Dec. 4)
	Dec. 6	Knowledge & the Universe	
16	Dec. 13	FINAL EXAM – 2-4pm	Final Exam (Dec. 13)